Knowledge Integration and Business Model Innovation: An Empirical Approach

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Abstract

Research on business model innovation has been developing across various perspectives in strategy and management research. One pervasive question pertains to the link between dynamic capabilities and business model innovation. Specifically, how do dynamic capabilities help firms innovate their business model to create a sustainable competitive advantage? We investigating the relationship between firm’s top management and alliance capabilities, two well-established dynamic capabilities, and value creation, delivery and capture, three well-established components of business model innovation. We develop hypotheses and propose a robust empirical approach to testing them. Our study contributes to the emerging literature on business model innovation by arguing dynamic capabilities are important antecedents to business model innovation, as well as highlighting the importance of business model innovation to a firms’ corporate innovation strategy. ? 125 words
Abstract
Research on business model innovation has been developing across various perspectives in strategy and management research. One pervasive question pertains to the link between dynamic capabilities and business model innovation. Specifically, how do dynamic capabilities help firms innovate their business model to create a sustainable competitive advantage? We investigate the relationship between firm’s top management and alliance capabilities, two well-established dynamic capabilities, and value creation, delivery and capture, three well-established components of business model innovation. We develop hypotheses and propose a robust empirical approach to testing them. Our study contributes to the emerging literature on business model innovation by arguing dynamic capabilities are important antecedents to business model innovation, as well as highlighting the importance of business model innovation to a firms’ corporate innovation strategy.

Introduction
Organizations often confront fast-paced environments characterized by short product life-cycles, frequent changes in customer needs, and rapidly changing business landscapes (Brown & Eisenhardt, 1997). These conditions are challenging for establishing a sustainable competitive advantage, and push innovation to the fore of firms’ corporate strategies (D’Aveni, Dagnino, & Smith, 2010). While traditionally firms’ innovation efforts were focused on product and process innovation, these forms of innovation are increasingly being seen necessary but not sufficient (Amit & Zott, 2012; Casadesus-Masanell & Zhu, 2013). More recently, firms are complementing their product and process innovation through innovation across their entire business model (Amit & Zott, 2012).
Despite its importance, innovating the business model is challenging and problematic (Foss & Saebi, 2017; Schneider & Spieth, 2013). It is thus crucial for firms to develop their capabilities for business model innovation (Mezger, 2014). Some researchers have argued that these intended capabilities are higher-order dynamic capabilities (Amit & Zott, 2014; Saebi, 2015; Teece, 2010). These capabilities encourage firms to effectively orchestrate their resources, identify opportunities, and manage the business process in synchronization with their environment (Leih, Linden, & Teece, 2015; Teece, Pisano, & Shuen, 1997). Moreover, strong dynamic capabilities will equip firms to build and renew resources and reconfigure business models in response to market changes (Teece, 2018), and to maintain long-term profitability (Amit & Zott, 2014). Therefore, systematic dynamic capabilities development encourages proficiency in business model innovation.

To date, the empirical literature investigating the relationship between dynamic capabilities and business model innovation is limited, with the majority of studies linking dynamic capabilities to business model innovation remaining conceptual (Amit & Zott, 2014; Saebi, 2015; Teece, 2018). As a result, there is confusion in the literature regarding whether dynamic capabilities are drivers of business model innovation (Achtenhagen, Melin, & Naldi, 2013; Schneider & Spieth, 2014), or whether business model innovation is a distinct capability in its own right (Mezger, 2014). Clarifying the determinants that affect business model innovation from a dynamic capabilities framework is a critical issue that needs to be addressed both for academic scholars and management decision-makers.

In this paper, we argue that dynamic capabilities are antecedents of business model innovation, and propose a rigorous empirical study to test our hypotheses. We deconstruct business model innovation into three core dimensions, which are value creation, value delivery, and value capture, and we identify two specific dynamic capabilities, namely Top Management Team (TMT) capabilities, and alliance capabilities, as essential capabilities base from both external and internal perspectives. Developing the specific capabilities enable firms to design, implement, and renew business model as well as assists them to resolve rigidities. Then, to capture more, we investigate both direct relationships as well as interactions. It is essential to examine both individuals, and collective interactions amongst the elements as this can disclose the relationships more comprehensively (Battistella, De Toni, De Zan, & Pessot, 2017).

We will test our hypotheses using longitudinal data from the information technology industry for over ten years. The data consists of TMTs data on their education diversity and network as well as alliance data, particularly on alliance experience and alliance portfolio diversity. These measurements consider the experiential and knowledge inputs to top
management and alliance capabilities. Moreover, this study also applies financial ratios as measures of the value creation, delivery and captures outputs of business model innovation. This inputs-outputs approach avoids overlap and causal ambiguity in the constructs, a problem plaguing research in the field.

Most empirical studies examined the relationship between dynamic capabilities and business model innovation are case studies and survey. Although have acknowledged the interactions, these two methods do not support the investigation in change and causality, which often obstruct generalizability. Innovation is a process characterized by the lapse of time between its implementation and outcomes. Therefore, capturing longitudinal data can assist the juxtapositioning and the comprehension of these concepts and their connections over time. The method applies in this study is a novel approach that may provide contributions to deepening our understanding of the process on the business model innovation.

**Literature Review**

Business models are an essential component in firms’ financial success and competitive advantage (Giesen, Berman, Bell, & Blitz, 2007). They represent the logic of how the firm creates value, supported by a set of an interdependent operational relationship between the firm’s internal unit as well as its stakeholders (Doz & Kosonen, 2010). Indeed business models have been attributed to the success of big corporations such as Microsoft, IBM, Southwest Airlines, and Google (Chesbrough, 2007; Giesen et al., 2007).

Business model has been defined as a description of organizations’ functions and relationships to achieve goals (Massa, Tucci, & Afuah, 2017), an architecture mechanism (Teece, 2010), and interdependent system to enable value creation and sharing activities (Zott & Amit, 2010). Some scholars also discuss that business model is a reflection of a firm’s strategy (Casadesus-Masanell & Ricart, 2010). Furthermore, researches in this field have proposed a variety of internal components and dimensions in their conceptualization of the business model (Amit & Zott, 2001; Demil & Lecocq, 2010; Teece, 2010). Among these, three particular value-based dimensions remain a recurrent feature, regardless of the research context, namely value creation, value delivery, and value capture (Osterwalder & Pigneur, 2010; Teece, 2010). Value creation explains how firms use their resources and capabilities to create value for their customers, suppliers, and partners along the value chain (Achtenhagen et al., 2013). Value delivery describes the mechanism of how value creation is offered to stakeholders (Johnson, Christensen, & Kagermann, 2008). Value capture defines how firms convert costs to attain profits (Teece, 2010). A business model is not single value creation, value delivery or
value capture by itself, but the design and interactions of all these dimensions together (Zott, Amit, & Massa, 2011). However, a successful business model increases firms’ risk of failure if they continue applying it without any adaptation to alterations, particularly in dynamic environments where the external competitive conditions are always in flux (Doz & Kosonen, 2010). Therefore, business model cannot be defined as a static feature of the firm, but as a dynamic system that changes over time to achieve sustainable performance (Achtenhagen et al., 2013).

Business model innovation is the process of modifying and reconstructing the components of the firms’ existing business models to adapt to environmental changes and potentially disrupt markets (Amit & Zott, 2010; Saebi, 2015). This reconfiguration results in a model that is new to the firm and/or new to the industry (Foss & Saebi, 2017). While a business model integrates many components, such as resources, capabilities, structures, and relationships (Zott & Amit, 2007), business model innovation is the fundamental reconfiguration of those components to drive change (Schneider & Spieth, 2013; Zott et al., 2011). This change, in turn, deliberately transforms the firms’ logic and activity system (Amit & Zott, 2010). Many argue that this type of innovation is at the heart of competitiveness, which increases firm growth and exhibits higher growth in average profit as well as provides long-term success (Sosna, Trevinyo-Rodríguez, & Velamuri, 2010).

Dynamic capabilities are vigorous capabilities that enable firms to develop their business model innovation systematically (Saebi, 2015). Dynamic capabilities are a set of capabilities that conjointly would allow firms to identify the need for change, formulate an appropriate response, and implement a course of action (Helfat & Peteraf, 2009). The activities include sensing changes in the business environment, seizing opportunities through knowledge integration and reconfiguring existing capabilities (Teece, 2007; Teece et al., 1997). Moreover, dynamic capabilities equip firms to build and renew resources, to reconfigure business models (Teece, 2017) as well as to maintain long-term profitability (Amit & Zott, 2014). Therefore, dynamic capabilities encourage proficiency in the business model innovation (Teece, 2017).

Yet, the few empirical studies investigating business model innovation and dynamic capabilities offer mixed understandings. Some studies have identified critical capabilities to enhance business model performance, such as experimenting and exploiting opportunities (Achtenhagen et al., 2013), building in-depth knowledge on internal resources and competencies (Schneider & Spieth, 2014) as well as innovation and networking capabilities (Battistella et al., 2017). These studies posit dynamic capabilities as drivers of business model innovation and those specific capabilities are strategic in the process of innovating the business
model. In contrast, Mezger (2014) in his empirical study, posits differently and argues that business model innovation can be conceptualized as distinct dynamic capabilities.

Although previous studies have explained the importance of dynamic capabilities to business model innovation, the empirical findings are insufficient to provide depth and detail (Teece, 2018). For example, dynamic capabilities have not been linked systematically to business model innovation (Foss & Saebi, 2017) and the mechanism of how the dynamic capabilities affect innovation in the business model as a continuous process has not yet been resolved (Schneider & Spieth, 2013). We now examine the interactions between dynamic capabilities and business model innovation, building on Achtenhagen et al. (2013), Battistella et al. (2017), Schneider and Spieth (2014), and Foss and Saebi (2017) to investigate dynamic capabilities as antecedents to business model innovation.

**Hypotheses**

Dynamic capabilities rely on an extensive learning process (Verreynne, Hine, Coote, & Parker, 2016) that has to be built inside the organizations. For this reason, establishing a strategic learning system and the mechanism through which firms conduct the learning process to attain business model innovation is essential (Berghman, Matthyssens, Streukens, & Vandenbempt, 2013). Furthermore, firms may develop their learning system and process through their internal-sourced and external-sourced capabilities. Our full paper will focus on explaining the relationships between two specific capabilities, top management team capabilities and alliance capabilities, and their differential impact on the three components of business model innovation (value creation, value delivery, and value capture). For brevity, here we present our first two hypotheses testing the broader relationship between TMT capabilities, alliance capabilities, and business model innovation. Our full model can be viewed in Figure 1.
Dynamic capabilities reside in a combination of top management capabilities (Leih et al., 2015; Teece, 2012). They are the strategic leaders who have substantially influenced the strategic decision-making in the organization. This decisive action includes innovating the business model that involve strategic planning and initiatives. The top management team has a critical role in identifying opportunities, considering moves, and making decisions related to the innovation processes. They are the conductor of assets orchestration and innovation processes. Thus their capabilities become essential. Scholars have argued that TMT capabilities are reflected in their cognitive and affective characteristics, which are a function of their education, experience, and values (Talke, Salomo, & Rost, 2010).

TMT with a diverse composition in terms of background and capabilities are essential dynamic capabilities (Carpenter, 2002), which would impact on firms’ innovation and performance (Talke, Salomo, & Kock, 2011). There are several reasons which underlying this argument. First, TMT diverse capability provides an extensive range of knowledge, skills, abilities, and competencies that encourage greater use of information, opportunity recognition, and knowledge creation (Dahlin, Weingart, & Hinds, 2005). Second, TMT with different
capability tends to have more disagreement, debate and task conflicts, which challenges the status quo (Michel & Hambrick, 1992). A situation which could stimulate critical thinking, creative thought, and open-minded discussion, which increase the ability to identify novel business opportunities (Talke et al., 2011). Third, TMT diverse capability escalates the boundary-spanning ability that leads to more extra-industry ties and enriches innovation orientation (Talke et al., 2011). Thus:

Hypotheses 1: Top Management Team (TMT) capabilities positively relate to changes in the value creation, delivery, and capture dimensions of business model innovation.

In this era of rapid and sudden changes, firms cannot achieve success in reinventing its business model in solitude. It is due to the resolution of resource inadequacies to succeed in innovation often requires engagement with knowledge outside the firm. Moreover, they might also reach beyond their existing expertise and come across the boundaries to solve problems. Concerning these difficulties, specific capabilities such as tacit knowledge, know-how ability, and distinctive routine are needed, yet sometimes absent in the firms. While these capabilities are not readily traded in the market, they can be acquired from other sources outside the firms through networking. Therefore, firms must cooperate with other firms to acquire external knowledge and integrate it with the internal experience (Cohen & Levinthal, 2000), since this new knowledge and new core competence may be an engine for novel change in the value creation and value capture.

One important strategic tool that has been used across industries to acquire knowledge from external partners is alliance capability. Alliance capability is “the ability to create successful alliances, based on learning approximately alliance management and leveraging alliance knowledge inside the company.” (Draulans & Volberda, 2003, p. 152). Alliance capability is critical to support value creation and capture from external resources. Previous studies have identified the positive impacts from the alliance for firms that are aligned with business model innovation such as costs reduction, risks mitigation improvement, and complementary resources optimisation, as well as enhancement of value capture from new value chain (Park, Mezias, & Song, 2004). Hence, the ability to select and engage the right partner is crucial, which is not an easy task. The potential partners involved in the alliance must have valuable complementary resources; otherwise, no beneficial impact will be achieved.

Alliance capability is developed over time through reiterated engagements, and it is path-dependent (Rothaermel & Deeds, 2006). There are three building blocks to establish alliance capability (Kale & Singh, 2007) that enable the process of generating business model
innovation. The first is the alliance experience. Firms with more alliance experiences are expected to have higher alliance capability and thus have higher possibility to succeed. The second is a dedicated alliances function, which is a specific unit and personnel responsible for the supervision and management of the alliance activity. The third building block is the alliance learning process, referring to the process of articulation, codification, sharing, and internalization of alliance management know-how within firms. Hence:

\textit{Hypotheses 2: Alliance capabilities positively relate to changes in the value creation, delivery, and capture dimensions of business model innovation.}

\textbf{Data and methods}

Our sample contains data on 350 firms in the information technology industry that represent a highly dynamic and innovative industry. Reports from the Clarivate Analytics Top 100 Global Innovators in the three consecutive years, 2016-2018, acknowledge firms in the information technology industry (GIC 45) as the majority innovators. We acquire the panel data from 2008 to 2017 using three different databases, namely BoardEx, Securities Data Company (SDC) Platinum, and Compustat. BoardEx holds extensive in-depth profiles of over 770,000 world’s business leaders, which we use to obtain data on TMT educational diversity and network size. SDC Platinum provides detail financial information on mergers, acquisitions and joint ventures, which we use to attain data on alliance experiences and alliance portfolio diversity. Compustat provides a large financial database, which a relevant source to acquire our firms’ financial data.

Our independent variables will be the TMT capabilities and alliance capabilities. First, to measure TMT capabilities, we will use educational diversity and network size. Educational diversity may provide access to knowledge variety, which is needed to accumulate, integrate and create new knowledge (Talke et al., 2011). Furthermore, the process of creating new knowledge also depends on the social networks of companies’ employees (Nahapiet & Ghoshal, 1998). These variables test our Hypothesis 1. Second, to measure alliance capability, we will use alliance experience and alliance portfolio diversity. Alliance capabilities are built through repeated partnership commitments over time, which allow the firm to codified their ability to manage procedures and learning-by-doing effects (Rothaermel & Deeds, 2006). Also, alliance portfolio diversity has become a crucial driver of value creation, which allows firms to manage various synergies amongst its alliances. These variables test our Hypothesis 2.

Our primary dependent variable will be the business model innovation, which is deconstructed into value creation, delivery and capture. We will use financial ratios as proxies to operationalize innovation in the business model as the advancement in this field (Foss &
Saebi, 2017). Financial ratios are essential to predict major events and demonstrate an objective indicator of organizations’ success and failure. Therefore, a substantial change in financial ratios indicates transformational events happen within the companies, such as a change in the business model (Foss & Saebi, 2015). An extensive review of the literature has been undertaken to determine our variables and measurements. Table 1 presents the details.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Dimensions</th>
<th>Measurements</th>
<th>Data Source</th>
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<td><strong>Dynamic Capabilities</strong></td>
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<td>(Leih et al., 2015;</td>
<td>Talke et al., 2011)</td>
<td>Other</td>
<td></td>
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<td>Teece, 2012)</td>
<td>Network (Faley, Kovacs, &amp; Venkateswaran, 2014)</td>
<td>Number of contact or people</td>
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<td>Alliance</td>
<td>Alliance experience (Hoang &amp; Rothaermel,</td>
<td>Number of alliances each year</td>
<td>SDC Platinum</td>
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<td>capabilities</td>
<td>2010; Rothaermel &amp; Deeds, 2006)</td>
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<td></td>
<td>Prescott, 2018)</td>
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<tr>
<td><strong>Business model innovation</strong></td>
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<td>Value creation</td>
<td>Employees capabilities (Clauss, 2017; Johnson</td>
<td>Labor efficiency (ratio of sales to employees)</td>
<td>Compustat</td>
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<td>(Clauss, 2017; Johnson et al., 2008)</td>
<td>et al., 2008)</td>
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<td></td>
<td>Technological infrastructure (Clauss, 2017;</td>
<td>R&amp;D Intensity (R&amp;D Expenses/Sales)</td>
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<td></td>
<td>Johnson et al., 2008)</td>
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<td></td>
<td>Resources (Demil &amp; Lecocq, 2010)</td>
<td>Resources allocation efficiency (ratio of operating income to assets).</td>
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<td></td>
<td>Management effectiveness (Osterwalder, Pigneur,</td>
<td>Fixed Assets Turnover (Net sales / Fixed assets)</td>
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<td></td>
<td>&amp; Tucci, 2005)</td>
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<td>Value delivery</td>
<td>Sales (Saebi, Lien, &amp; Foss, 2017; Spieth &amp;</td>
<td>Sales / Account Receivables</td>
<td>Compustat</td>
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<td>(Clauss, 2017; Osterwalder &amp;</td>
<td>Schneider, 2015)</td>
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<td></td>
<td>Customer segment &amp; relationship (Johnson et al.,</td>
<td>Receivables efficiency (sales to receivables ratio)</td>
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<td>2008; Osterwalder et al., 2005)</td>
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<td></td>
<td>Brand management (Johnson et al., 2008)</td>
<td>SGA Expenses / Assets</td>
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<td></td>
<td>Distribution channel (Osterwalder et al.,</td>
<td>Inventory turns (Cost of goods sold/inventory)</td>
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<td>2005; Spieth &amp; Schneider, 2015)</td>
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<td>Value capture</td>
<td>Margin model (Demil &amp; Lecocq, 2010; Johnson et al., 2008)</td>
<td>Gross profit / sales</td>
<td>Compustat</td>
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<tr>
<td>Revenue management</td>
<td>Account Receivables / Operating income</td>
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<td>Cost management</td>
<td>COGS / Operating revenue</td>
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<td>Non-operating cost structure</td>
<td>Financial expenses / Other operating items</td>
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We will apply multiple regression analysis on our entire model. This analysis helps to understand how the typical value of dependent variables changes with any change of the independent variables. We will also include several control variables to account for alternative explanations and reduce the chance of omitted-variable bias. Each variable on the dynamic capabilities framework will be tested as direct relationship with the business model innovation as well as interaction with each of the value elements of value creation, delivery, and capture. Moreover, we will also address endogeneity problem in our model by applying general dynamic generalized method of moment (GMM). GMM is a systematic procedure to handle endogeneity in panel data.

Conclusion
Our research model contributes to clarifying the role of dynamic capabilities in business model innovations, and highlighting several significant roles of dynamic capabilities for business model innovation. Our main arguments focus on how firms that exhibit strong elements of TMT capabilities and alliance capabilities can facilitate business model innovation through value creation, delivery and capture, which in turn enhances firm performance. Our study contributes to the emerging empirical literature on business model innovation, through a robust empirical approach tracking 357 firms’ capability development and business model innovation over 10 years. We address the casual ambiguity that often happens in this area through operationalizing TMT capabilities and alliance capabilities as inputs into the process and BMI as the outputs.

References


